Chapter 2: Physics in Action

Chapter Challenge - p. 128

10 Video (2-3 min) [under 2, over 5 min -1pt/30s]

5 Entertaining

25 Physics principles (3 req'd, +5pt ea add.)

5 Spoken/audio

5 Turn in script

24 Presentation Rubric

74

Section 1 Newton's First Law: A Running Start (p. 132) 10/02/17

WDYS People playing soccer, goalie + 3 other ppl + animals, # runs up to the ball + kicks it way too hard, other dude kicks the ball high but it doesn't travel far from him (sadly), caterpillar struggles to push ball, mouse has more success,

WDYT momentum, speed, inertia, gravity

Section 1 Newton's First Law: A Running Start (p. 132)

IWBAT

- describe Galileo's law of motion
- apply Newton's first law of motion
- recognize inertial mass as a property of matter
- explain that speed depends on frame of reference.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

Section 1 Newton's First Law: A Running Start (p. 132)

Investigate

Hold the ramp by placing no more than two fingers at each end and pressing the ends gently toward the center to cause a gentle bend.

Section 1 Newton's First Law: A Running Start

Physics Talk (p. 134)

Galileo named inertia, introduced experimental science to the world,

He concluded that a ball rolling on a horizontal track will roll in a straight line forever

Inertia is the natural tendency of an object to remain at rest or move with constant speed in a straight line

A frictional force makes objects stop

A force is a push or a pull

Science, government, and philosophy all changed due to Newton's insights

Newton expanded on Galileo's law of inertia

Section 1 Newton's First Law: A Running Start

Physics Talk (p. 134)

Whatever is in motion remains in motion

An object's inertia depends on its mass

A moving object will move forever, but our intuition says that it will stop.

$1\ kg = 1000\ g \approx 2.2\ lbs$

Speed - the change in distance per unit of time

the more different velocities we add together, the greater the speed of a kicked or thrown object will have

Section 1 Newton's First Law: A Running Start

Physics Talk (p. 134)

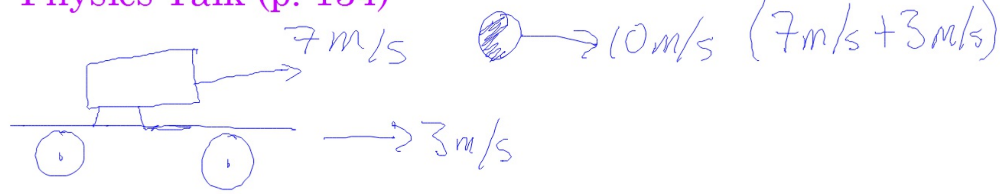
acceleration – the change in velocity per unit of time; it occurs during starting, stopping, and changing direction

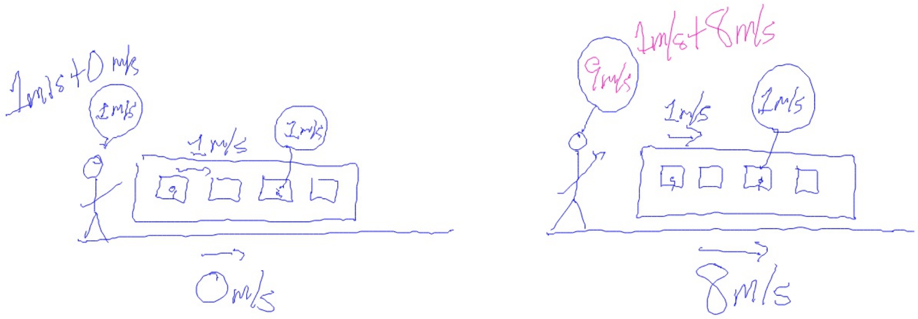
When you throw a ball, the ball's speed is the sum of your speed before releasing the ball and the speed of the release relative to your body

frame of reference – a vantage point with respect to which speed and motion can be described

Section 1 Newton's First Law: A Running Start

Physics Talk (p. 134)





Section 1 Newton's First Law: A Running Start

Complete:
Checking Up (p. 138) #1, 2, 5, 6
Physics to Go (pp. 143-144) #1-4, 10
WDYTN (p. 141)

Section 2 Constant Speed and Acceleration: Measuring Motion

p. 145

10/06/17

WDYS A boy walking leaving a lot of footprints behind (slow) possibly going to school (backpack + papers)
Bottom pic: running, leaving only 4 footprints in a greater distance than walking
Snail in ~~top~~ top pic showing how slow he is walking
Walking through a park w/ city in background
bottom pic: flowers + heart (date?)
Top pic: Z (tired or sleep walking), Closer to dog

WDYT 100 mph means how far you get in one hour
45 m/s " " one second
Traveling at a constant speed

Section 2 Constant Speed and Acceleration: Measuring Motion

IWBAT
- give examples of distance, time, speed, and acceleration
- differentiate between instantaneous and average speed
- recognize when motion is accelerated
- calculate average speed and acceleration.

Via
- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

Section 2 Constant Speed and Acceleration: Measuring Motion

p. 145

Investigate:
- One set of tapes and graphs per team
- Please use graph paper to set up your graphs
- Each dot is placed every 1/60th of a second ... 60 dots are drawn each second

Homework:
Find 3 examples of Newton's First Law of Motion (or Galileo's Law of Inertia) in sports (Olympic or otherwise). Be prepared to share out on Monday.

Section 2 Constant Speed and Acceleration: Measuring Motion

Physics Talk (p. 148)

When you traveled at a slow constant speed the ticks were closer together than when you traveled at a fast constant speed. When you travel at a fast speed, you cover a greater distance in one time interval.

As speed increases, the distance between the dots increases. (positive acceleration)

As speed decreases, the distance between the dots decreases. (negative acceleration)

v_{AV} (average speed) $= \frac{\Delta d \text{ (change in distance)}}{\Delta t \text{ (time elapsed)}}$

instantaneous speed – the speed at the moment

a (acceleration) $= \frac{\Delta v \text{ (change in velocity)}}{\Delta t \text{ (time elapsed)}}$

Section 2 Constant Speed and Acceleration: Measuring Motion

Complete:
Checking Up (p. 151) #1-4
Physics to Go (pp. 154-156) #2, 3, 7, & 11
WDYTN

Section 3 Newton's Second Law: Push or Pull p. 157 10/11/17

WDYS the stick seems to be moving her, the speed is increasing, the puppy goes from a walk to driving a tiny car, blue ball, Calm → Confused → concerned, dog is trying to catchup or keep up w/ her

WDYT a force is a push or a pull on an object
Something that causes a change in motion
The heavier ball will go slower
The weight determines how the force affects the ball

Section 3 Newton's Second Law: Push or Pull

IWBAT

- identify the forces on an object
- determine when forces on an object are either balanced or unbalanced
- compare amounts of acceleration semi-quantitatively
- apply the definition of the Newton as a unit of force
- describe weight as the force due to gravity.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

Section 3 Newton's Second Law: Push or Pull   p. 157

Investigate:

Your items to push include:

- cart
- plastic bottle
- weighted cart

There are four pennies per group for steps 8 & 9.

Quantitative – quantities – stuff you can measure

Qualitative – using your senses

Section 3 Newton's Second Law: Push or Pull

Evidence for Newton's Second Law of Motion (p. 160)

Leslie

Newton's Second Law: The acceleration of an object is directly proportional to the unbalanced force acting on it and inversely proportional to the object's mass. The direction of the acceleration is the same as the direction of the unbalanced force.

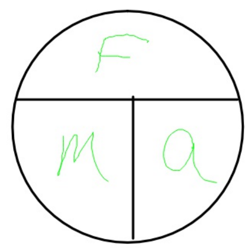
- Its very important to note that acceleration decreases with the increase in mass(The more the weight, the less acceleration).
- The larger force produces a larger acceleration. As force gets larger, the acceleration gets larger.
- The larger the mass, the smaller the acceleration(As the mass gets larger, the the acceleration gets smaller) for the same amount of force.

Section 3 Newton's Second Law:
Push or Pull

An Equation for Newton's Second law of Motion (p. 161)

Angelina

-Newton's second law of motion can be written as a equation
Acceleration = force/mass or a=f/m
-a is acceleration in meters per second squared
-f is force expressed in newton's (N)
-m is mass expressed in kilograms (kg)
-With algebra you can find the unknown quantity of F,M, or a
a=f/m, f=ma , or m=f/a



Section 3 Newton's Second Law:
Push or Pull

Newton: A Derived SI Unit with a Special Name (pp. 161-162)

Izzy

A newton is a derived SI unit with a special name. A newton is the force required to make one kilogram of mass accelerate at one meter per second squared.

$$1N = 1\frac{kg\,m}{s^2} = 1\ kgm/s^2$$

$$F(N) = m(kg)\ a(m/s^2)$$

Section 3 Newton's Second Law: Push or Pull

Where There's Acceleration, There Must be an Unbalanced Force (p. 162)

Clarina

Anything that accelerates, has an unbalanced force acting upon it causing the acceleration

- When applying the same amount of force to objects of different masses the result is:
  - Large Mass= Small Acceleration
  - Small Mass= Large Acceleration
- If the mass of an object is very large, you may not even be able to measure its acceleration because it is too small

Section 3 Newton's Second Law: Push or Pull

Calculations and Units (p. 163) & Using Measurements in Calculations (p. 164)

Angelina

It's important to pay attention to the units in your answers
-you can write N as kg* m/s ^2 - kg cancels itself
-m/s^2 is needed for your answer

-Looks at the significant figures or digits in the number it represents how carefully and level of accuracy the measurement was taken.
-<u>A calculation will never add a significant figure</u>
-Your calculations should have no more than 2 significant figures.

Section 3 Newton's Second Law: Push or Pull

Determining the Number of Significant Figures in a Measurement (p. 165)

Clarissa

All nonzero numbers are considered to be significant figures
  - The measurement 152.5 m has four significant numbers
- Zeros may or may not be significant depending on their place in a number
  - A zero between nonzero digits is a significant figure
    - In the measurement 308 g The zero is a significant figure - It has 3 significant figures
  - A zero at the end of a decimal number is considered significant
    - In the measurement 1.50 N the zero is a significant figure - it has 3 significant figures
  - A zero at the beginning of a decimal number is not significant
    - The two zeros in 0.023 kg are not significant - it has 2 significant figures
  - In a large number with no decimal point, the zeros are not significant
    - The zeros in 2000 kg are not significant - it has one significant figure
- When adding or subtracting,
  - the final result should have the same number of decimal places as the the measurement with the fewest decimal places
- When multiplying or dividing,
  - The result should have no more significant digits than the factor having the fewest number of significant digits

Section 3 Newton's Second Law: Push or Pull

Gravity, Mass, Weight, and Newton's Second Law (p. 166)

Priscilla

You know that if you apply a force of 1.0 N to a 1.0-kg mass the mass will accelerate at a rate of 1.0 m/s^2. That means that if you observe a 1.0-kg mass accelerate at 1.0m/s^2 there must be a 1.0 N force acting on it.

- Calculate the weight of an object **F**gravity=**ma**gravity **W**=mg
- Where **W** is the weight (by definition the force of gravity) **M** is the mass in kilograms **g** is the acceleration due to gravity (9.8 m/s^2)
- Weight is the force of gravity acting on an object and it depends on the mass of the object and the acceleration due to gravity.
- The force of gravity is just another word for weight.

Section 3 Newton's Second Law:
Push or Pull

Balanced and Unbalanced Forces (p. 167)

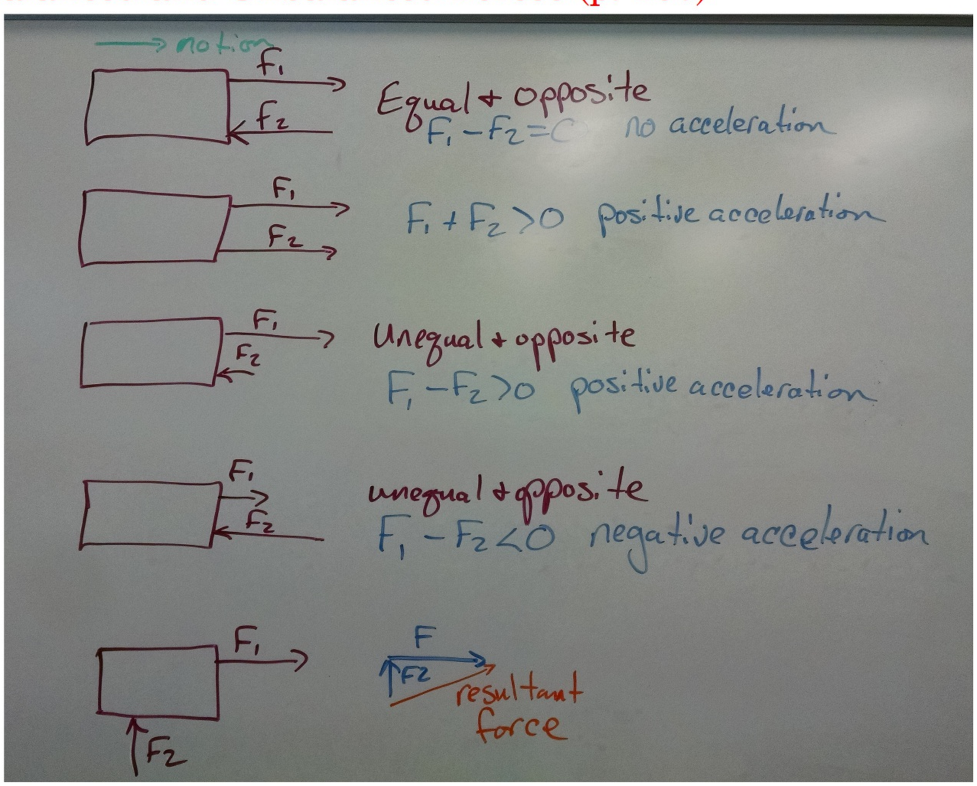
Leslie

A free body diagram: is a diagram used to show the relative size and direction of all forces acting on an object.

- ○ When you hold an apple on your hands, that apple does not move based on the force of gravity acting upon it.
- Sometime the force you apply is immediately balanced by a frictional force or a force of air resistance so that there is no acceleration.

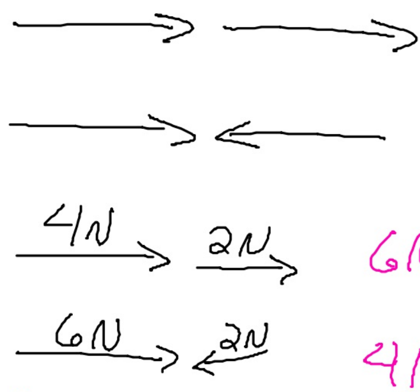
Section 3 Newton's Second Law:
Push or Pull

Balanced and Unbalanced Forces (p. 167)



Section 3 Newton's Second Law: Push or Pull

Adding vectors (p . 168)



Same direction: add

opposite direction: subtract

6N to the right

4N to the right

direction determined by larger force

Section 3 Newton's Second Law: Push or Pull p. 157

Complete:
Checking Up (p. 167) #1-4
Physics to Go (pp. 172-173) #3, 4, 10, 12, & 15
WDYTN

Section 4 Projectile Motion: Launching Things into the Air

p. 174

10/13/17

WDYS

A girl standing on one leg on a ladder with one hand throwing a green apple over a guy's head and with the other hand she drops the red apple.
The guy has two heads because he's timing how long it takes the apples to hit the ground.
There's a cat sitting + dog running away from falling apple
The guy's hat flies off

WDYT

Force, speed, weight determine how far an object will travel

Section 4 Projectile Motion: Launching Things into the Air

p. 174

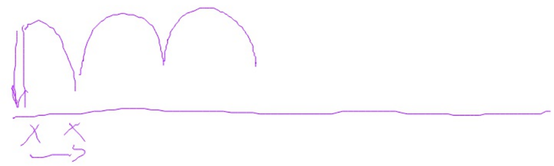
IWBAT

- apply the terms free fall, projectile, trajectory, and range
- provide evidence concerning projectiles launched horizontally at different speeds
- explain the relationship between the vertical and horizontal components of a projectile's motion
- recognize the factors that affect the range of a projectile
- infer the shape of a projectile's trajectory.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

Section 4 Projectile Motion: p. 174
Launching Things into the Air



Investigate

Part A

#2: You will only use your fingers to move the coin.
#4: Use text books to change the height of the launch.

IWBAT apply the terms free fall, projectile, trajectory, and range; provide evidence concerning projectiles launched horizontally at different speeds; explain the relationship between the vertical and horizontal components of a projectile's motion; recognize the factors that affect the range of a projectile; and infer the shape of a projectile's trajectory.

Section 4 Projectile Motion: p. 174
Launching Things into the Air

Physics Talk (p. 177)

Projectile - an object traveling through the air or other medium

The horizontal motion of a coin doesn't affect its downward motion

Both coins fall the same amount each 1/10 of a second

Your preconceptions can affect your perceptions

The horizontal velocity remains the same (no air resistance), but the vertical velocity is constantly changing.

On earth, the vertical acceleration of a ball is 9.8 m/s^2

Up is + a and down is - a

IWBAT apply the terms free fall, projectile, trajectory, and range; provide evidence concerning projectiles launched horizontally at different speeds; explain the relationship between the vertical and horizontal components of a projectile's motion; recognize the factors that affect the range of a projectile; and infer the shape of a projectile's trajectory.

Section 4 Projectile Motion: Launching Things into the Air   p. 174

At the top of the path, the velocity is 0 m/s, but the acceleration is $-9.8 \, m/s^2$

The horizontal velocity of the object will remain constant since there is no force acting horizontally (w/o air resist)

Mathematical predictions can be made for the motion of a thrown object

IWBAT apply the terms free fall, projectile, trajectory, and range; provide evidence concerning projectiles launched horizontally at different speeds; explain the relationship between the vertical and horizontal components of a projectile's motion; recognize the factors that affect the range of a projectile; and infer the shape of a projectile's trajectory.

Section 4 Projectile Motion: Launching Things into the Air   p. 174

Complete:
Checking Up (p. 178) #1-3
Physics to Go (pp. 182-183) #5, 6, & 7
WDYTN

IWBAT apply the terms free fall, projectile, trajectory, and range; provide evidence concerning projectiles launched horizontally at different speeds; explain the relationship between the vertical and horizontal components of a projectile's motion; recognize the factors that affect the range of a projectile; and infer the shape of a projectile's trajectory.

Section 5 The Range of Projectiles: The Shot Put p. 184 10/18/17

WDYS A soccer game underway, the first girl kicked the ball really high, the second didn't go as high, but went quickly to the goal; it shows the different forces that affect the ball, the score on the board is equations; a boy uses his head to move the ball, the boy running toward the ball shows speed; a dog watches

WDYT they continue moving because there's force behind them
steep: long distance up, but not to the side as far
medium: not as high up, farther to the side
low: not much up, travels farthest to the side
Greater force is needed for greater speed
Greater speed results in greater heights & greater distance

Section 5 The Range of Projectiles: The Shot Put p. 184

IWBAT
- measure the acceleration due to gravity
- calculate the speed attained by an object that has fallen freely from rest
- identify the relationship between the average speed of an object that has fallen freely from rest and the final speed attained by the object
- calculate the distance traveled by an object that has fallen freely from rest
- use the mathematical models of free fall and uniform speed to construct a physical model of the trajectory of a projectile
- use the motion of a real projectile to test a physical model of projectile motion
- use a physical model of projectile motion to infer the effects of launch speed and launch angle on the range of a projectile.

Via
- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

Section 5 The Range of Projectiles: The Shot Put p. 184

Investigate

Step 1: We will use the second method: tickertape timer with a weight.

Steps 3 & 4: Mass w/ strings already assembled.

Steps 5-11: Class as one group

IWBAT measure the acceleration due to gravity, calculate the speed attained by an object that has fallen freely from rest, identify the relationship between the average speed of an object that has fallen freely from rest and the final speed attained by the object, calculate the distance traveled by an object that has fallen freely from rest, use the mathematical models of free fall and uniform speed to construct a physical model of the trajectory of a projectile, use the motion of a real projectile to test a physical model of projectile motion, and use a physical model of projectile motion to infer the effects of launch speed and launch angle on the range of a projectile.

Section 5 The Range of Projectiles: The Shot Put p. 184

Physics Talk (p. 188) Model

A projectile has two motions at the same time and they don't affect one another:
- constant speed corresponding to the launch speed and its direction
- downward acceleration due to gravity

For a scientific model to be accepted, the model must match reality in nature

Mathematical models are to help understand how things in nature work

Trajectories of projectiles can be modeled using a computer to ease the manipulation of variables such as launch speed, angle, and height.

Section 5 The Range of Projectiles: The Shot Put

p. 184

Trajectories are parabolas if you ignore air resistance
*45° launch = longest distance
*Two angles that sum to 90° should have the same range even though their trajectories are different
*Same launch speed

Air resistance makes trajecteries change from the expected parabolic path.

Air temperature can affect the range of the projectile.

Complete:
Checking Up (p. 189) #1-3
Physics to Go (pp. 194-195) #1, 2, 3, 4, 6, & 8
WDYTN

IWBAT measure the acceleration due to gravity, calculate the speed attained by an object that has fallen freely from rest, identify the relationship between the average speed of an object that has fallen freely from rest and the final speed attained by the object, calculate the distance traveled by an object that has fallen freely from rest, use the mathematical models of free fall and uniform speed to construct a physical model of the trajectory of a projectile, use the motion of a real projectile to test a physical model of projectile motion, and use a physical model of projectile motion to infer the effects of launch speed and launch angle on the range of a projectile.

Chapter 2 Mini-challenge pp.196-197

10/24/17

Section 6 Newton's Third Law: Run and Jump

p. 198

10/30/17

WDYS A guy pushing himself off of a house's wall

He uses force towards the house to move away from the house

He was on a wheeled chair

He's moving really quickly (blew dog's hat off)

Guy in back on skate board/scooter

The air is strong

Section 6 Newton's Third Law: Run and Jump

p. 198

WDYT I don't remember learning how to jump so it's really hard to explain it as a series of steps

Section 6 Newton's Third Law: Run and Jump

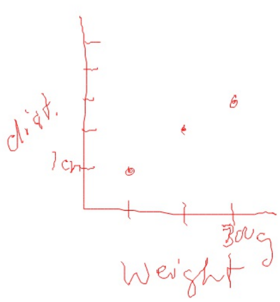
p. 198

IWBAT
- provide evidence that forces come in pairs with each force acting on a different object
- use Newton's third law to analyze physical situations
- describe how Newton's third law explains much of the motion in your everyday life.

Via
- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

Section 6 Newton's Third Law: Run and Jump

p. 198



Investigate
Part A
1 & 2: Class
3 & 4: Small group

Part B
1-4: Small group

IWBAT provide evidence that forces come in pairs with each force acting on a different object, use Newton's third law to analyze physical situations, and describe how Newton's third law explains much of the motion in your everyday life.I will do this through team experiments and discussions with my team and the whole class.

Section 6 Newton's Third Law: Run and Jump p. 198

Physics Talk (p. 201)

Pushing & Pulling Back (p. 201)

- The leg movement was towards the wall, but the student movement was away from the wall. This push/force is equal to and opposite from the push of the student on the wall.
- Student A accelerated because of Student B's force on Student A. When Student A was pushing on Student B, this caused Student B to accelerate in the opposite direction.
- When walking, the floor is responsible for the force that pushes you forward. The force of you on the floor was equal and opposite in direction to the force of the floor on you.
- Newton's 3rd Law: For every applied force there is an equal and opposite force. The two forces always act on different objects.
- You cannot do anything to make the forces unequal.

IWBAT provide evidence that forces come in pairs with each force acting on a different object, use Newton's third law to analyze physical situations, and describe how Newton's third law explains much of the motion in your everyday life.I will do this through team experiments and discussions with my team and the whole class.

Section 6 Newton's Third Law: Run and Jump

Physics Talk (p. 201)

Inanimate objects can push back (p. 202)

Every surface bends when you apply a force to it.
The amount of the bend depends on the amount of force needed and the material applying the force.

IWBAT provide evidence that forces come in pairs with each force acting on a different object, use Newton's third law to analyze physical situations, and describe how Newton's third law explains much of the motion in your everyday life.I will do this through team experiments and discussions with my team and the whole class.

Section 6 Newton's Third Law: Run and Jump

Physics Talk (p. 201)

Identifying the opposite and equal forces (p. 203)

- Just because there are two forces which may be equal and opposite in a situation, they may not be a pair of forces
- We limit the scope of our interest to pairs of forces to simplify problems

IWBAT provide evidence that forces come in pairs with each force acting on a different object, use Newton's third law to analyze physical situations, and describe how Newton's third law explains much of the motion in your everyday life.I will do this through team experiments and discussions with my team and the whole class.

Section 6 Newton's Third Law: Run and Jump

Physics Talk (p. 201)

How to draw a free body diagram (p. 203) & Drawing free body diagrams (p. 204)

- Used to show the direction and relative strength of all of the forces acting on an object
- Each force is represented by an arrow, the direction of the arrow is the direction of the force, the size of the arrow is the strength of the force, each arrow is labeled to show the type of force
- The weight of an object can be represented by an arrow emerging from the center of mass (where all of the object's mass is considered to be concentrated), other forces are drawn at the point of contact
- The object is often depicted as a box
- Even though gravity acts on all parts of a mass, you only have to worry about the center of mass and concentrate all of the forces there for the purpose of the drawing

IWBAT provide evidence that forces come in pairs with each force acting on a different object, use Newton's third law to analyze physical situations, and describe how Newton's third law explains much of the motion in your everyday life.I will do this through team experiments and discussions with my team and the whole class.

Section 6 Newton's Third Law: Run and Jump
Physics Talk (p. 201)
How Newton described the third law of motion (p. 204)

- If you push on something, that object pushes back on you with an equal amount of force in the opposite direction
- Forces always come in pairs

IWBAT provide evidence that forces come in pairs with each force acting on a different object, use Newton's third law to analyze physical situations, and describe how Newton's third law explains much of the motion in your everyday life.I will do this through team experiments and discussions with my team and the whole class.

Section 6 Newton's Third Law: Run and Jump
Physics Talk (p. 201)
Challenging Newton's third law (p. 205)

In order to find out why something happens, we have to look at all of the different forces which are applied

IWBAT provide evidence that forces come in pairs with each force acting on a different object, use Newton's third law to analyze physical situations, and describe how Newton's third law explains much of the motion in your everyday life.I will do this through team experiments and discussions with my team and the whole class.

Section 6 Newton's Third Law: Run and Jump

Complete:
Checking Up (p. 205) #1-3
Physics Plus (p. 206) #1
Physics to Go (pp. 208) #2, 3, 4, & 8

IWBAT provide evidence that forces come in pairs with each force acting on a different object, use Newton's third law to analyze physical situations, and describe how Newton's third law explains much of the motion in your everyday life.I will do this through team experiments and discussions with my team and the whole class.

Section 7 Frictional Forces: The Mu of the Shoe

p. 210 11/08/17

WDYS Shes trying to pull the skate across the ice it looks easy Shes trying to pull the skate across the beach it looks harderI see a guy trying to pull a shoe in two different situations. One on sand and the other one on ice. During the procedure on both situations, it seems to be easier to pull on ice than on sand.
Ice skating, Pulling a shoe easily, Beach

WDYT Some sports require special shoes so that way their shoes aren't affecting the way they play.Some sports require different shoes to be able to play the sport itself or to be able to have more balance while playing this sport.

Different features on a shoe can help , for example ice skaters they need ice skates with blades on them because with regular shoes you will slip and slide and definitely not be able to ice skate. So the blade helps them have friction so they aren't falling everywhere. It would be helpful for specific sports to require different features based on where the sport is being played to be able to successfully play the game without problems like soccer.

Section 7 Frictional Forces:
The Mu of the Shoe

IWBAT apply the definition of the coefficient of sliding friction, measure the coefficient of sliding friction between soles of athletic shoes and a variety of surfaces, and calculate the effects of frictional forces on the motion of objects. I will do this via participating in collaborative experiments, team and whole class discussions to clarify key concepts, and collaboratively answering questions targeting key concepts using vocabulary such as friction and force.

Section 7 Frictional Forces:
The Mu of the Shoe

Investigate:
Complete using a new gym shoe.

μ = mu

IWBAT apply the definition of the coefficient of sliding friction, measure the coefficient of sliding friction between soles of athletic shoes and a variety of surfaces, and calculate the effects of frictional forces on the motion of objects.

Section 7 Frictional Forces: The Mu of the Shoe

Physics Talk

- The force of the table and the weight of the shoe need to be equal because they have to cancel according to Newton's second law. Since the shoe was moving with constant velocity, there was no net force. Using the value for the pulling force to measure the value of the friction force is fine because they must be equal in strength.
- The vertical forces on the shoe must add up to zero according to Newton's 2nd law.
- A normal force is a force that is perpendicular to the surface.
- The force of friction is equal to the force required to slide the object with a constant speed.
- If the surface is not horizontal or if the forces are angled upward, mu would be harder to determine.
- Mu(μ) has no units of measurement and is usually expressed in decimal form
- Mu is only valid for the pair of surfaces in contact when the value is measured. Any changes in the surfaces will change the value of mu.
- Mu is the coefficient of sliding friction.

IWBAT apply the definition of the coefficient of sliding friction, measure the coefficient of sliding friction between soles of athletic shoes and a variety of surfaces, and calculate the effects of frictional forces on the motion of objects.

Section 7 Frictional Forces: The Mu of the Shoe

Checking Up: p. 214 #1-3
WDYTN: p. 216
PtG: pp. 218-219 #1-4, 8

IWBAT apply the definition of the coefficient of sliding friction, measure the coefficient of sliding friction between soles of athletic shoes and a variety of surfaces, and calculate the effects of frictional forces on the motion of objects.

Section 8 Potential & Kinetic Energy: Energy in the Pole Vault

p. 220

11/10/17

WDYS There is a party on top of a building, There is a pool jumper trying to get up to the party, A man standing in front of the building holding a balloon, A sign that says "Join Our Party If You Can Make It!! 20 ft. High" , The building has a sign stating that it is closed, There is a dog running toward the wall I see a person with a straight stick running and the stick bending getting the person off the ground. A group of people throwing a party on the roof of a building 20ft high, A sign that says " join the party if you can make it 20 ft high", A girl using a long stick to try and jump up to the party

WDYT Champion pole vaults are not long enough or the person, The person's height can affect the height they can goMaybe because the pole is too short and when they let go they will be just a little bit short of making it over the bar The speed of the person is added onto the equation. Weight of the vaulter ·Size of the area they are doing it in

Section 8 Potential & Kinetic Energy: Energy in the Pole Vault

IWBAT recognize that restoring forces are active when objects are deformed, apply the equation for the force necessary to compress or stretch a string, conduct simulations of the transformation of energy involved in the pole vault, and measure the transformations among the different forms of energy. I will do this via participating in collaborative experiments, team and whole class discussions to clarify key concepts, and collaboratively answering questions targeting key concepts using vocabulary such as energy, transformation, and work.

Section 8 Potential & Kinetic Energy: Energy in the Pole Vault

Investigation:
Skip step #2.

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Section 8 Potential & Kinetic Energy: Energy in the Pole Vault

Deformation Video (0-3:03)

Physics Talk

- When a force acts on an object, the speed and position of the object may change
- In many cases, the speed and position of the object change such that they cannot return to their original values
- At the top of the trajectory, the vertical position has increased and its vertical speed has decreased to zero
- As the object falls, it will return to its original height and the speed will return to its original value right after the force was applied
- Two concepts of energy are kinetic energy (energy of motion) and gravitational potential energy (energy of position)
- When forces act on objects, energy changes from one form to another, but the sum of kinetic and potential energy remains constant
- The concept that total energy remains constant is the law of conservation of energy
- Whenever a force is applied to an object over a distance, work is done
- Work = force x distance
- Elastic potential energy is the energy of a spring due to its compression or stretch
- Food energy provides muscle energy for movement gaining kinetic energy

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Section 8 Potential & Kinetic Energy: Energy in the Pole Vault

Physics Talk

- If there were 28 blocks, there will always be 28 blocks. If there were 28 units of energy, there will always be 28 units of energy.
- Work=force x distance, W (N*m) = f (N) * d (m)
- Elastic (spring) potential energy EPE = 0.5 *k (N/m) *x^2 $(m)^2$, k = spring constant (how stiff the spring is), x = amount of bending (stretch/compression)
- Gravitational potential energy GPE = m (kg) *g (m/s^2) *h (m)
- Kinetic Energy KE = 0.5 *m (kg) *v^2 $(m/s)^2$
- Units for work/energy 1 Newton-meter (N*m) = 1 Joule (J) "jewel" = 1 $kg*m^2/s^2$

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Section 8 Potential & Kinetic Energy: Energy in the Pole Vault

Checking Up: p. 227 #1-4
WDYTN: p. 231
PtG: pp. 232-233 #3-6, 14, 16

IWBAT recognize that restoring forces are active when objects are deformed, apply the equation for the force necessary to compress or stretch a string, conduct simulations of the transformation of energy involved in the pole vault, and measure the transformations among the different forms of energy.

Section 9 Conservation of Energy: Defy Gravity p. 234 11/15/17

WDYS Man ice skating and doing a spin in the air, Woman in helicopter timing the man spinning, People in background cheering him on a guy is doing spins in the air, a girl in the helicopter is timing him, the helicopter is falling apart, the pigeon and penguin look confusedGirl driving a helicopter timing herself or the guy who is twirling up into the air, Crowd of people, Ice ring I see someone skating really really high. It looks like he is swirling higher and higher. There is a fish in the bottom and a penguin. There is also a helicopter.

WDYT I don't know what hang time means, No because them spinning has an effect on gravity's pull on them i dont think it would because when the athlete is in the air so i would think gravity is pushing him up, I would think so cuz gravity doesn't help them stay up in the air they must have to do something to stay up there for just the right amount of time to do their tricks I don't know what "hang time" means, Yes a world figure skater does defy gravity to stay in the air for a while I don't know what Hang-time means.

Section 9 Conservation of Energy: Defy Gravity

IWBAT measure changes in height of the body's center of mass during a vertical jump, calculate changes in the GPE during the jump, apply the definition of work and recognize how it is related to energy, apply the joule as a unit of work, apply the concept of conservation of energy to the analysis of a vertical jump using vocabulary such as weight, force, and height.

Section 9 Conservation of Energy: Defy Gravity

Physics Talk

- When moving in the air to the peak position, your GPE increased and your KE decreased. In your peak position you had 100% GPE. When falling, your GPE decreased while your KE increased.
- When you are in the ready position you have EPE. The potential energy you will use is the chemical energy in your muscles. As you move towards launch, you change EPE into GPE and KE.
- Conservation of energy is a unifying principal in science.
- Forms of energy include: sound, light, chemical, nuclear, and internal (heat) energies
- All of these energies together must have a constant sum/total
- Any energy can be measured and calculated
- Objects can gain or lose energy, but what is lost or gained is equal to energy lost or gained by another object.

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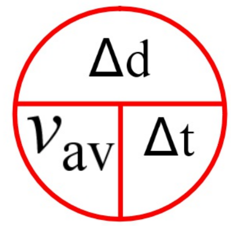
Section 9 Conservation of Energy: Defy Gravity

Checking Up: p. 241 #1-3
WDYTN: p. 242
PtG: pp. 244-245 #1, 4-9, 13

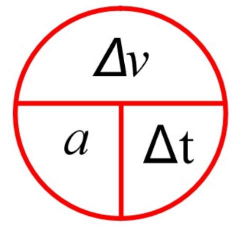
IWBAT measure changes in height of the body's center of mass during a vertical jump, calculate changes in the GPE during the jump, apply the definition of work and recognize how it is related to energy, apply the joule as a unit of work, apply the concept of conservation of energy to the analysis of a vertical jump using vocabulary such as weight, force, and height.

$$v_{av} = \frac{(v_1 + v_2)}{2}$$

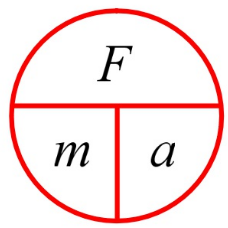
$$v_{av} = \frac{\Delta d}{\Delta t}$$



$$a = \frac{\Delta v}{\Delta t}$$



$$F = ma$$



$$d = \frac{v_i^2}{2a}$$